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**Date:** July 11, 2007

**Pages:** 11 incl.

**Re:** United States of America Patent Application No. 10/031,592

Title: POLYCHROMATIC PRINTED CORKS AND METHOD  
FOR MAKING THE SAME

Filing Date: January 23, 2002

Inventor: Ivailo E. Stanimirov et al.

**Dear Mrs. Ferguson,**

We again express our categorical objection to the rejection of Claim 1(8) about: “POLYCHROMATIC PRINTED CORKS AND METHOD FOR MAKING THE SAME” as unpatentable, according to 35 USC 103(a). The grounds for this rejection stated by you are based on a technically unbacked supposition, which is made through confrontation of the already considered patents of Ramzeilles (FR 2,312,373), (December 1, 2006) and Collins (US Patent 5,641,573), (May 22, 2003).

The additionally included patent of Meckler (US Patent 4,182,458) is obviously irrelevant to the subject discussed, because of which we will not comment it.

In the patent of Ramzeilles (FR 2,312,373), object for marking is not cylindrical cork of natural cork, even not cylindrical cork of synthetic material, but a thin-wall cup-shaped capsule of shrink film, which is put from outside on the bottle neck. Defining the capsule as object with “non-calibrated cylindrical surface”, without considering the fact that during the whole technological process it is based on mandrel 4, accepting its exact geometric form and mechanical stiffness, is technically incorrect.

In the offset method used by Ramzeilles (FR 2,312,373) – traditional one for the existing level of technology – there is no kinematical synchronizing connection between the object for printing (7), positioned on mandrel 4, and the image-transferring cylinder 29.

The purely frictional contact between them is not able to ensure the necessary kinematical accuracy during mutual rolling off in order to be achieved an imprint of precise contour and quality reproducibility, which is obligatory for industrial products.

In the particular case, this effect of “slippage” – known in the technical theory – is additionally enhanced by the lubricating action of ink layer and the inadmissible from the kinematical point of view linear contact between the rotating transferring cylinder 29 and conical capsule 7 based on mandrel 4.

The indefinite transmission ratio caused by simultaneous frictional contact of points with different peripheral velocity (due to the changing radius of conical surface) is reason for generating non-controllable kinematical error leading to bad contour and deformation of image in separate areas and as a whole.

Probably, the inventor Ramzeilles has made this technical compromise because of the following reason:

The partial thermal treatment of capsule surface by flame device 26 is necessary as for increasing the ability of ink to penetrate into synthetic capsule as well as for its strong fixture on mandrel 4 by thermal shrinkage. Under these circumstances, the removal of capsule 7 from mandrel 4 could be impossible, if the surface was non-conical.

The assumption that the method of Ramzeilles is designed for application of polychromatic image – without kinematical synchronization of the object for printing and the printing element - contradicts the principles proved in polygraphic technique. That’s why, the inventor himself does not claim such thing nowhere.

For the specialists in this field would be obviously that in the patent of Ramzeilles (FR 2,312,373) are no rational technical solutions, which we could borrow for achieving our final purpose – imprinting of qualitative polychromatic image on cylindrical surface of corks of natural cork and corks mixtures in industrial way.

In connection with the ironical remark made “....because people believe that only the natural cork allows the wine to mature properly.....”, maybe it is necessary to explain that the unique features of the natural cork are due to the containing in it chemical compounds, which do not permit carrying out of putrefactive processes and formation of microorganisms. Namely this makes it still irreplaceable raw material in wine industry, when preservation of taste qualities of bottled products is required, at long duration of consumer application.

The limited natural resources of natural cork and increased consumption are the main ground for continuous demand of its substitutes.

In this sense, the corks of synthetic material used in wine industry must cover the same production standards as the corks of natural cork. Essentially, they are connected with the degree of chemical resistance to the bottled product, hermetic sealing, possibility for application of surface coatings providing the allowable force of safe pressing in and cork removal from the bottle, as well as possibility for application of marking stable to rubbing out.

Unfortunately, the formal unification of these production standards does not lead to mechanical borrowing of methods and technical means. That's just what has had in mind the inventor Collins in the text quoted by expert (column 1, lines 11-13), making comparison between much easier ink reception from the surface

of natural cork caps with this of the corks made of synthetic materials (column 1, lines 7-9), when they are to be marked. It is known that in case of corks made of synthetic materials is not possible to imprint an image stable to rubbing out without preliminary preparation of the surface (column 2, lines 8-12). The marking itself is performed by a traditional for the existing technique offset method and machine (column 3, lines 5-8) without claiming that the image is polychromatic.

The patent of Collins "PRINTED SYNTHETIC RESINOUS CORKS AND METHOD OF MAKING SAME" is one proof more that namely the physical and mechanical properties of the object for printing determine the methods and technical means for its realization.

The polygraphic method of offset printing used by inventors Ramzeilles and Collins is applicable to objects with smooth, clean and geometrically precise surface, and sufficient dimension stability. It is obviously that the cork of natural cork has no one of these characteristics. This is the main reason that as in patent of Ramzeilles, as well as in patent of Collins, is not mentioned - nowhere - of technical applicability of their methods for printing on corks of natural cork and cork mixtures, not to mention of quality polychromatic image.

The statement that through engineering sign integration of solutions from the quoted by you patents of Ramzeilles (FR 2,312,373) and Collins (US Patent 5, 641, 572) it is possible synthesizing of production method for application of quality polychromatic image on cylindrical surface of corks of natural cork and cork mixtures, is absolutely unbacked from technical point of view.

Until the moment of making our application (July 29, 1999), the experts of the patent departments, with which we were dealing, did not find any patents

connected with similar industrially applicable technology. An indirect proof for that is the absence of this product on the market till the appearance of our invention nevertheless that both consumers and producers wished its appearance.

The existing polygraphic methods and technical means for application of polychromatic print on calibrated cylindrical objects are non-applicable when the matter in hand is for corks of natural corks and cork mixtures, because of the specific physical-mechanical qualities of its structure and their non-calibrated surrounding surface.

Leading by wish to create a new product for wine industry with a new consumer value, combining the qualities of two separate elements – cork cap and decorative capsule, we carried out the necessary investigations, analyses and laboratory tests in order to find out the reasons hindering industrial production of cork cap with quality polychromatic image, by means of traditional for the existing technical level polygraphic methods.

Bearing in mind your warning that - with a view to the procedure – this is our last possibility for argumentation of our objection, we are forced again to analyze the technical problems, which are solved by the created from us **new technology** for production of this **new product** – cork with quality polychromatic image on its cylindrical surface, manufactured by a new and acknowledged by you for invention **industrial method** for polychromatic printing.

1. What are the general technical principles characterizing the existing equipment for laying polychromatic image on cylindrical surface until priority date of our application – July 29, 1999?

- The application of separate colors is performed consecutively by separate color stations;
- It is necessary to maintain precise angle orientation of the object for print toward the printing elements for each primary color;
- Providing rotary motion with sufficient kinematical accuracy during rolling off the object for print in the printing element.

## 2. What are the requirements to the object for print?

- The object should have a smooth, clean, light and geometrically precise surface;
- The object should have the necessary dimensional stability allowing repeatedly force influence on it without causing durable deformation of its structure.

## 3. What are the specific physical-chemical features of corks of natural cork?

- Arousing residual (durable) deformation in structure in case of exercising force influence on them;
- Different density and hardness of particular areas from the surrounding surface;
- Availability of cracks and solid inclusions;
- Impossibility for production of calibrated cylindrical articles from natural cork because of the above-mentioned reasons. Typical of them are the deviations from round and cylindrical form;
- High surface dust loading due to the microporous structure and methods for mechanical processing used (grinding of the cylindrical surface).

It is obviously that in production of corks of natural cork material these structural features are not subject to technological control or correction because their combination is unique for each one specimen.

That is the main reason for inapplicability of the known methods and machines for polychromatic print on cylindrical surface when the matter in hand is corks of natural cork and cork mixtures. Such attempts have been made, but they have finished unsuccessfully because of the following reason:

In force influence of the printing profile on the object for print (natural cork caps and cork mixtures), an uncontrolled shift of the working position is obtained because of the residual deformation caused in the structure of natural cork.

It is technically beyond question that in consequent passing of cork through the separate color stations, the angle kinematical error between the object to be printed and printing elements of separate colors will grow, which could make impossible the synthesizing of quality polychromatic image.

#### 4. What kind of print is most appropriate from polygraphic point of view?

The branch experience shows that when the case of point is printing on cylindrical corks of natural cork and cork mixtures, only the contact method of type "High print" has found practical value for industrial application. In contrast to offset printing, the printing profile is convex here, from which result the following advantages:

- The convex printing profile minimizes the contact area allowing at relatively less force influence on the object the necessary local surface deformation for eliminating geometrical errors, roughness and areas of different hardness to be obtained;
- The convex printing profile allows simultaneous and direct contact of all printing elements with the object to be printed, which improves the force balance in the working position at their counter location;



- The imprinted image is color saturated and stable to abrasion because of deeper penetration of ink layer into the microporous structure by pressure;
- High operating reliability of the process through the harder contamination of the printing profile. This is due to the “sucking effect” of the microporous structure at separation of the printing profile;
- High operating recourse of the printing profile because of the relatively higher relief.

5. What are the possibilities of offset method for printing on corks of natural cork and cork mixtures?

As we already said above, it is known from polygraphy that offset printing is applicable in objects with smooth, clean (dedusted), light and geometrically precise surfaces having sufficient dimensional stability of structure under force influence.

From the point of view of the concrete operating conditions, offset printing is industrially inapplicable because of the following unfavorable factors:

- Fast surface contamination of the image transferring cylinder because of electrostatic adhesion and accumulation of cork dust, since the cork marking always precedes the other operations for application of surface coatings;
- Necessity of higher force influence on the cork for overcoming geometrical deviations and roughness through the increased contact, leading to higher deformation of the object and tendency to move the working position.

Summarizing all said up to here, it is clear that in order to be created an industrial technology for realization of this new product – cork with quality polychromatic image on the cylindrical surface, we must use the contact method of

type “High print”, but in such way that no kinematical error has been accumulated as a result of residual deformation in cork structure.

6. How could be combined these contradictory requirements?

This is possible through the method developed by us for simultaneous and direct application of the primary colors on the cylindrical surface of corks from natural cork and cork mixtures, during synchronized rotation of the object for print and the printing elements to 360<sup>0</sup>. This method is unique in polygraphic technique because of which all honored experts, including you, have acknowledged it for invention together with the unique machine realizing it. The method and the machine are consistent with the specific physical and mechanical properties of natural cork structure.

It is obviously that the new article – cork, according to Claim 1(8), is invention as well, since thanks to our inventive activity for the first time appears an industrially manufactured, cylindrical, non-calibrated product with quality polychromatic image on its surrounding surface. We frankly hope you have convinced of that from the specimens sent.

7. What are the advantages of our new technology?

- Possibility for synthesizing precise polychromatic image on the surrounding surface of non-calibrated cylindrical articles manufactured from materials, whose structure is characterized by residual deformation;
- Possibility for simultaneous, direct on object and precise imprinting of all primary colors at one operating position, during synchronized rotation of the printing elements and the object to 360<sup>0</sup>.
- Possibility for counter location of the printing elements, type “High print”, leading to better force balance at the working position and better quality of the image.

I frankly hope these technical explanations to prove in categorical way that the cork with printed in industrial way quality polychromatic image on its cylindrical surface is **INVENTION** produced by unique technology of two inventions – method and machine.

We will be waiting for taking a final technically reasoned decision as on your part as well on the part of institution represented by you, acknowledging for **INVENTION** the cork, according to Claim 1(8):

**Claim 8: Cork with printed image on its non-calibrated cylindrical surface, characterized by that the image is polychromatic and produced by the method of claim.**

In taking the decision, please accept the version of description and claims introduced long ago, where the claim for the cork is already last – 8<sup>th</sup>.

**Sincerely,**

**Dipl. Eng. Zdarvko GESHEV**

**Inventor**

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